

REMARKS

Claims 1-49 are pending in the application. Claims 1-21 and 36-49 have been withdrawn from consideration as being directed to a non-elected invention. Accordingly, claims 22-35 are under examination in the above-identified application. Applicant has reviewed the rejections set forth in the Office Action mailed February 24, 2004, and respectfully traverse all grounds for the reasons that follow.

With regard to the maintenance of the restriction requirement, Applicant respectfully requests reconsideration and rejoinder of some or all of the groups of claims. As set forth in Applicant's previous response, examination of some or all of the groups of claims does not pose a serious burden on the Examiner. If the Examiner decides upon reconsideration that the restriction is to be maintained, Applicant respectfully requests a "second-eye review" as now implemented under the Restriction Practice Action Plan. Under the Action Plan, rejoinder practice is viewed favorably when examination of claims together would not pose a serious burden on the Examiner.

Applicant would like to thank Examiners Smith and Marschel for extending a personal interview with Applicant's representatives on March 24, 2004. As recorded in the Interview Summary, the rejection under 35 U.S.C. §§ 101 and 102 were discussed. The amendments above and remarks below are believed by Applicant to substantially conform to the subject matter discussed during the interview. Applicant respectfully requests the Examiner's reconsideration and withdrawal of these rejections.

Regarding the Information Disclosure Statement, the Office alleges that the two documents printed from the Genelogic website fail to comply with the Applicant's duty to disclose all information material to examination of the above-identified application because they do not contain the dates of public availability. The Office asserts that the date of printing does not satisfy the requirements of 37 C.F.R. §§ 1.97, 1.98 and M.P.E.P. § 609. The Genelogic printouts have been placed in the file but have not been considered on the merits.

Applicant submits that the disclosure of these documents satisfy Applicant's duty to disclose material information and, further, that the date of printing is sufficient for

consideration on the merits. The content requirements of an Information Disclosure Statement is set forth in 37 C.F.R. § 1.98 and specifies that a date of publication be provided for each publication listed in an Information Disclosure Statement. Because the date of printing of the Genelogic documents is prior to the filing date of the above-identified application, this date is sufficient for consideration on the merits. Further, to require Applicant to contact the entity hosting the website and require them to disclose to Applicant the date the documents were posted is an undue burden on Applicant. Applicant has submitted the website documents for review giving a date prior to Applicant's filing date and there is no substantial reason why the two Genelogic documents should not be reviewed. Accordingly, Applicant respectfully requests that this objection be withdrawn and review of the two website documents on the merits be made and shown on the record.

Rejections Under 35 U.S.C. § 101

Claims 22-35 stand rejected under 35 U.S.C. § 101 for being directed to non-statutory subject matter allegedly because the claims appear to lack a physical result performed outside the computer or directed to a practical application in the technological arts. The Office asserts that step (a) of claim 22 refers to a reference biological system that is perturbed, but that this perturbation may be interpreted to occur only in a computer simulated biological system. The Office relies on the M.P.E.P. §§ 2106 (IV)(B)(2)(b)(i) and (ii) as authority for these alleged requirements.

Applicant submits that the claims as filed are directed to subject matter satisfying the statutory requirements § 101. The M.P.E.P. sections quoted in the Office Action are safe harbors for assessing statutory subject matter for computer-related process inventions. In fact, the heading of the first two quoted paragraphs in the Office Action is entitled "Safe Harbors" for statutory process claims. The first quoted paragraph describes the safe harbor provision for "Independent Physical Acts" and the second quoted paragraph describes the safe harbor provision for "Manipulation of Data Representing Physical Objects or Activities." Thus, the quoted sections are directed to subject matter that is clearly statutory. For example, the first paragraph quoted for § 2106 (IV)(B)(2)(b)(i), states:

Thus, if a process claim includes one or more post-computer processing steps that result in a physical transformation outside of the computer (beyond merely conveying the direct result of the computer operation), the claim is clearly statutory.

Office Action at page 4 (emphasis added); M.P.E.P. § 2106 (IV)(B)(2)(b)(i).

The third M.P.E.P. paragraph quoted in the Office Action, § 2106 (IV)(B)(2)(b)(ii), sets forth as an alternative that a computer-related process directed to a practical application in the technological arts constitutes established statutory computer-related subject matter. This section, entitled “Computer Related Processes Limited to a Practical Application in the Technological Arts,” also admonishes against evaluation of form over substance when assessing statutory subject matter when it states:

What is determinative is not how the computer performs the process, but what the computer does to achieve a practical application.

Office Action at page 5 (citation omitted).

Apparent from the cited M.P.E.P. sections in the Office Action is the absence of the paragraph setting forth and describing the authority most applicable to the claimed invention on statutorily patentable algorithms. In this regard, the Federal Circuit held in *State Street v. Signature Financial Group*, 149 F.3d 1368, 47 U.S.P.Q.2d 1596 (1998); 525 U.S. 1093, (1999) (cert. denied) that a claim to a data processing system was statutory subject matter when the system produced a concrete, tangible and useful result. Similarly, the subsequent holding of *AT&T Corp. v. Excel Communications, Inc.*, 172 F.3d 1352 (Fed. Cir. 1999), reaffirming *State Street*, also is not relied on by the Office to assess whether the claimed subject matter is statutorily patentable. *AT&T* held that a claimed computer process was statutory because the produced value was a useful, non-abstract result that represents information about a telecommunication call. *Id.* at 1358.

The M.P.E.P. § 2106 (IV)(B)(2)(b)(ii) provides guidance to Office Examiners for the application of the *State Street* and *AT&T* holdings when it states:

For such subject matter to be statutory, the claimed process must be limited to a practical application of the abstract idea or mathematical algorithm in the technological arts. . . . A claim is limited to a practical application when the

method, as claimed, produces a concrete, tangible and useful result; i.e., the method recites a step or act of producing something that is concrete, tangible and useful. See *AT&T*, 172 F.3d at 1358, 50 USPQ2d at 1452. Likewise, a machine claim is statutory when the machine, as claimed, produces a concrete, tangible and useful result (as in *State Street*, 149 F.3d at 1373, 47 USPQ2d at 1601) . . . For example, a computer process that simply calculates a mathematical algorithm that models noise is nonstatutory. However, a claimed process for digitally filtering noise employing the mathematical algorithm is statutory.

Id. at para. 4.

As described below, the claimed subject matter satisfies the statutory requirements for patentable subject matter. In this regard, the claimed subject matter has a practical application because it produces a useful, non-abstract result representing information about a thing as held in *AT&T*, or a useful, concrete and tangible result, as held by the *State Street* court. The claimed invention also satisfies the safe harbor guidelines enumerated in the M.P.E.P. because it can produce a physical result outside the computer M.P.E.P. § 2106 (IV)(B)(2)(b)(i).

The claimed invention is directed to a method for assigning a cellular function to a component of a biochemical system. The method consists of perturbing a component of a network in a reference biochemical system; determining a multidimensional coordinate point representing a data element of one or more components of perturbed biochemical system; comparing the multidimensional coordinate point to a reference data element region, and determining if the multidimensional coordinate point is within or outside the reference data element region. A multidimensional coordinate point outside of the reference data element region indicates that the component is linked to the perturbed biochemical network and is assigned a cellular function of the network.

Regarding the perturbation referenced in step (a) of claim 22, Applicant submits that the step includes an act performed outside the computer. For example, the application describes at page 30, lines 14-22, that a perturbation can include “any physical modification or treatment of the biochemical system as well as exposure to any stimulus. Therefore, a perturbation can include, for example, genetic alterations, contact with macromolecules, compounds, agents and drugs, and exposure to changes in and environmental stimuli or procedural manipulations of a biochemical system.” The perturbation can be of a biological

system, which is described in the application at, for example, page 22, lines 26-29, to mean “a group of interacting, interrelated, or interdependent molecules that form a functional biochemical unit such as, for example, an organism, organ, tissue, cell or subcellular system.” Therefore, the Office’s construction of this claimed step to occur only in a computer simulated biological system appears too restrictive in light of the meaning of the term perturbation as set forth and claimed in the application. Accordingly, the claimed invention includes acts performed outside of the computer.

The claimed invention also satisfies the statutory criteria for patentable subject matter because it produces a useful, non-abstract result representing information about a component of a biochemical system. As described at, for example, page 7, line 24 through page 8, line 11, assigning a cellular function to a component of a biochemical system produces a useful, non-abstract result because the assignment or identification of such information results in either a global or focused description of systems, subsystems, networks, pathways and single components. The identified function of the component or the description of the system, subsystem, network or pathway can be used for diagnosing pathological conditions or for identifying intervention points for therapeutic applications (see also, page 58, lines 15-30, and page 106, line 29 through page 110, line 6).

Similarly, the methods of the invention produce a useful, concrete and tangible result because the comparison and determination of whether a multidimensional coordinate point is within or outside a reference data element region identifies the role of an actual component in the biochemical system which, as described above, is useful to diagnose disease or intervene therapeutically. The roles of the actual biochemical system components are concrete and tangible because it is an functional attribute of the biochemical system between, for example, a normal and a perturbed state such as a disease. For example, the application describes at, for example, page 25, line 29 through page 26, line 4, that a component is intended to mean “a molecular constituent of the biochemical system, network or pathway, such as, for example, a polypeptide, nucleic acid or other macromolecule or other biological molecule.” Therefore, the claimed invention is directed to statutory subject matter because it results in a practical application as held in *AT&T* and *State Street* and as summarized in M.P.E.P. § 2106

(IV)(B)(2)(b)(ii). Accordingly, this ground of rejection is respectfully requested to be withdrawn.

Claims 22-35 also stand rejected under 35 U.S.C. § 101 for being directed to non-statutory subject matter because the claimed method allegedly manipulates numbers, abstract concepts or ideas, or signals representing such manipulations. The Office asserts that a process consisting solely of a mathematical operation, without some claimed practical application such as executing a mathematical algorithm, is not statutory subject matter.

Applicant submits that the claimed methods are statutorily patentable. In this regard, the previous judicial exclusion and the Freeman-Walter-Abele test, applied to identify unpatentable mathematical algorithms, was put to rest in *State Street*, when the Federal Circuit clarified that:

Unpatentable mathematical algorithms are identifiable by showing that they are merely abstract ideas constituting disembodied concepts or truths that are not “useful.” From a practical standpoint, this means that to be patentable an algorithm must be applied in a “useful” way.

State Street, 149 F.3d at 1373 & n.4

In holding that the transformation of financial data by the claimed system constitutes a practical application of a mathematical algorithm, formula or calculation, because it produces “a useful, concrete and tangible result,” the *State Street* court further explained that:

[A]fter *Diehr* and *Alappat*, the mere fact that a claimed invention involves inputting numbers, calculating numbers, outputting numbers, and storing numbers, in and of itself, would not render it nonstatutory subject matter, unless, its operation does not produce a “useful, concrete and tangible result.”

Id. at 1374 & n.7 (citations omitted).

As described previously, the invention is directed to a method for assigning a cellular function to a component of a biochemical system. Such assignment or identification of function is practical because it can be used, for example, for the diagnosis of diseases or therapeutic intervention to treat a disease. The acts of comparing and determining if a multidimensional coordinate point of a perturbed biochemical system is within or outside of a reference data element region that indicates linkage to a perturbed biochemical network and

assignment of cellular function similarly is a useful, concrete and tangible result because it provides a description of the role of an actual component or of the biochemical system. These descriptions can be used, for example, for the diagnosis diseases or identify points of therapeutic intervention for treatment of a disease. Therefore, the claimed invention does not consist solely of a mathematical operation without a claimed practical application as held by the *State Street* court. The claimed invention not only manipulates values but it also perturbs network components and identifies linkages of such components that assigns a cellular function. Accordingly, the claimed methods are directed to statutory subject matter. Withdrawal of this ground of rejection is respectfully requested.

Rejections Under 35 U.S.C. § 112

Claims 22-35 stand rejected under 35 U.S.C. § 112, first paragraph, allegedly for lacking enablement for a method of assigning any cellular function to a component of a biochemical system. The Office asserts that a difference in data for a component between a reference and a perturbed state could be linked to the perturbed state. However, assignment of any cellular function to a component that is not necessarily linked or outside of the perturbed network or pathway requires undue experimentation.

To enable the claimed invention, all that is required is to teach those skilled in the art how to make and use the invention as claimed without undue experimentation. *Genentech, Inc. v. Novo Nordisk A/S*, 108 F.3d 1361, 1365 (Fed. Cir. 1997), *Johns Hopkins Univ. v. CellPro, Inc.*, 152 F.3d 1342, 1360-61 (Fed. Cir. 1998). Applicants have satisfied this standard.

The invention claims perturbing a component of a network in a reference biochemical system; determining and comparing a multidimensional coordinate point to a reference data element region, and determining if the multidimensional coordinate point is within or outside of the reference data element region. The last recited step of independent claims 22, 24 and 30 all recite that a multidimensional coordinate point outside of the reference region indicates that “[the] component is linked to [the] perturbed biochemical network, and is thereby assigned a cellular function of [the] network.” Therefore, the claims expressly link the recited component to the perturbed biochemical network as well as the cellular function of that component to the cellular function of that network. Because the cellular function of a component is linked to a perturbed biochemical network and assigned a cellular function of that network,

Applicant is not claiming assignment of any cellular function as asserted by the Office. Accordingly, the full scope of the claims as filed are enabled by the application and withdrawal of this ground of rejection is respectfully requested.

Rejections Under 35 U.S.C. § 102

Claims 22-35 stand rejected as allegedly anticipated by Stoughton et al. (U.S. 6,351,712). The Office asserts that Stoughton et al. describe laboratory and computer methods for testing and confirming network model representations of a biological pathway in a biological system where relative changes in the biological system are compared in response to perturbations of the network. The Office further asserts that Stoughton et al. describe predicting how output classes behave in response to the chosen experiments by finding measures of relative change of cellular constituents and finding goodness of fit of observed components to an output class based on correlations representing a linkage to the perturbed biochemical network. The measures of relative change are alleged to correspond to multidimensional coordinate points and the overall goodness of fit of the network model is alleged to correspond to a network-associated region.

The application describes and claims perturbing a network component; determining and comparing a multidimensional coordinate point to a reference data element region, and determining if the multidimensional coordinate point is within or outside of the reference data element region. A multidimensional coordinate point outside of the reference data element region indicates that the component is linked to the perturbed network and is assigned a cellular function of that network. The claimed invention is distinguishable from Stoughton et al. because Stoughton et al. do not describe determining a multidimensional coordinate point.

A multidimensional coordinate point corresponds to a coordinate that is a combination of two or more data elements. Stoughton et al. do not describe a method which determines a multidimensional coordinate point as claimed by the invention. In this regard, the application teaches, for example, at page 17, line 25 through page 18, line 18, that a multidimensional coordinate point refers to “a coordinate defined by “n” parameters, where n is the number of components in a biochemical system, or subset thereof, and each parameter is a data element of a component of the biochemical system, or subset thereof.” Therefore, a

multidimensional coordinate point is a single coordinate that represents multiple components of a biochemical system. The application teaches such integration of data elements into a single coordinate when it states:

Therefore, a multidimensional coordinate point representative of a data element of two components is defined by two parameters corresponding to values representative of data elements of the two components. The data elements can be values corresponding to a characteristic of a component or a characteristic of a component relative to another component. Similarly, a multidimensional coordinate point representative of data elements of three molecules is defined by three parameters corresponding to values representative of the data elements of the three components. A multidimensional coordinate point representative of the data elements of n components is defined by n parameters corresponding to the values of the data elements of n components.

Application at page 17, line 30 through page 18, line 18.

The application further exemplifies that a multidimensional coordinate point is generated by the combination or integration of data elements for two or more components. For example, the application teaches:

[A] multidimensional coordinate point can represent data elements of a set of two or more components. For example, a multidimensional coordinate point representative of the data elements of two molecules is defined by two parameters corresponding to the data elements of the two components. . . . A multidimensional coordinate point representative of the data elements of n molecules is defined by n parameters corresponding to the data elements of n molecules.

A multidimensional coordinate point can represent a single component, for example, when two or more data elements describe the component. The two or more data elements can be the same type of data elements, [or] different types of data elements.

Application at page 37, line 12 through page 38, line 5.

The Example at pages 110-113 further exemplifies the generation of a multidimensional coordinate point corresponding to a coordinate containing values representing two or more data elements (see also, page 39, lines 22-23). Therefore, the invention claims determining a multidimensional coordinate point where the multidimensional coordinate point is a coordinate containing multiple values representing a data element.

In contrast, Stoughton et al. appear to describe methods for analyzing microarray data. The data analyzed between microarrays consists of only a single type of data, namely, gene expression data. Gene expression levels measured from samples under different conditions are compared on a gene by gene basis. Stoughton et al. do not appear to combine values into a multidimensional coordinate point nor do Stoughton et al. appear to compare such a multidimensional coordinate point to a reference data element region.

For example, all of the Figures and the Examples appear to describe the measurement and comparison of expression profiles. The text cited by the Office also does not appear to describe generating a multidimensional coordinate point consisting of multiple values represented in a single coordinate. Instead, the cited abstract appears to describe the comparison of relative changes in the biological system or describe a statistical goodness of fit analysis for assessing whether a network model predicts observed changes of cellular constituents. Therefore, these citations fail to describe the combination of values into a multidimensional coordinate point as claimed by the invention. Absent a description of a determination of a multidimensional coordinate point as claimed, or comparing such a multidimensional coordinate point to a reference data element region as claimed, Stoughton et al. cannot anticipate the claimed invention. Accordingly, Applicant respectfully requests withdrawal of this ground of rejection.

CONCLUSION

In light of the Remarks herein, Applicant submits that the claims are in condition for allowance and respectfully request a notice to this effect. Should the Examiner have any questions, she is invited to call the undersigned attorney.

Respectfully submitted,

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